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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/523,446	03/10/2000	Qiming Chen	10991148-1	5325
22879	7590	11/19/2003	EXAMINER	
HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400			WU, YICUN	
			ART UNIT	PAPER NUMBER
			2175	12

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/523,446

Applicant(s)

CHEN ET AL.

Examiner

Yicun Wu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 2-18, 20, 22-25 and 27-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-6, 14, 16-18, 20, 22-25, 27 and 28 is/are rejected.
- 7) ☒ Claim(s) 2-3, 7-13, 15 and 29-30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet.  
37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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### III. DETAILED ACTION

#### REOPENING of PROSECUTION

1. In view of the appeal brief filed on August-21-2003, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 4-5, 14, 16-18, 20, 22-25 and 27-28, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuzhilin (U.S. Patent No. 6,236,978 B1) in view of Jiawei Han, ("Towards On-Line Analytical Mining in Large Databases," ACM SIGMOD Record, 27:1, pp. 97-107, 1998 and Han hereinafter).

As to Claims 27, 14 and 28, Tuzhilin teaches a method for detecting telecommunication fraud(i.e. fraud detection systems Tuzhilin Col. 14, lines 30-32) performed in a data processing system having a data warehouse and an OLAP server, the method comprising:

retrieving a plurality records from data warehouse (i.e. user transaction collection and recording unit) (Tuzhilin Fig. 6a);

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generating a calling profile cube (i.e. m-dimensional space Tuzhilin Col. 7, lines 60-67) based on the call records; wherein the calling profile cube includes information on multiple customers (Tuzhilin Col. 3, lines 40-41, and Col. 5, line 4-20 and Fig. 1-3);

generating a volume-based calling pattern cube for each individual customer based on the multi customer calling profile cube (Tuzhilin Col. 3, lines 40-41 and Fig. 1-3);

comparing the volume-based calling pattern cube for each customer to a predetermined fraudulent volume-based calling pattern (Tuzhilin Col. 11, line 65) and (Tuzhilin Col. 3, lines 40-41 and Fig. 1-3); and

when the volume-based calling pattern cube is in a first predetermined relationship with predetermined fraudulent volume-based calling pattern, performing a first action (Tuzhilin Col. 12, lines 1-3) and (Tuzhilin Col. 11, lines 65) and (Tuzhilin Col. 3, lines 40-41 and Fig. 1-3).

Tuzhilin does not explicitly teach OLAP.

Han teaches OLAP (Han Fig. 1 and page 3, section 2.2-2.3 and page 4, section 2.4, page 5 section 2.5, page 6 section 2.6).

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Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Tuzhilin to include: OLAP.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Han by the teaching of Tuzhilin to include: OLAP with the motivation to greatly enhance the power and flexibility of exploratory data mining as taught by Han (See page 2, paragraph 3).

As to claim 4, Tuzhilin as modified teaches a method for analyzing the calling pattern cube (i.e. data cube) by utilizing at least one performing OLAP operation on data cubes (See Han page 3, section 2.3).

As to claim 5, Tuzhilin as modified teaches a method for OLAP operations is one of a roll-up operation, a drill-down operation, a dice operation, a slice operation (See Han page 3, section 2.3) and an ad-hoc query (i.e. be able to browse conveniently, See Han page 3, section 2.2).

As to claim 16, Tuzhilin as modified teaches a data processing system comprising:

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an analysis tool for use by a data analyst to perform one of comparing the calling pattern cube to known fraudulent calling pattern cube (Tuzhilin Col. 13 lines 51-52, Col. 14 lines 28-32) and extracting information from the calling pattern cube based on selected dimensions, levels, and ad-hoc queries provided by the data analyst (Han page 4, section 2.4, page 5 section 2.5, page 6 section 2.6) and (page 3, section 2.2).

As to claim 17, Tuzhilin as modified teaches a data processing system comprising:

a visualization tools for use by a data analyst to display the calling pattern cube in different formats, levels and dimensions (See Han page 3, section 2.2, 6<sup>th</sup> paragraph).

As to claims 18 and 23, Tuzhilin as modified teaches a data processing system comprising:

a data staging tool for transferring data between the profile cube stored in the OLAP server and profile table in the data warehouse at predetermined time intervals (See Han Fig 1).

As to claim 20, Tuzhilin as modified teaches a method comprising:

utilizing an OLAP server to create a calling profile cube (See Tuzhilin Col. 7, lines 35-67), updated calling profile cubes (See Tuzhilin Fig. 2, and Col. 7, lines 35-67), derive calling pattern cubes from the calling profile cube, analyzing calling pattern cubes, and comparing calling pattern cubes (See Tuzhilin Fig. 4 and col. 11, lines 43-52);

wherein OLAP programming supported by the OLAP server provides a scalable computation engine for generating and processing the calling pattern cubes (Han Fig. 1 and page 3, section 2.2-2.3).

As to claim 22, Tuzhilin as modified teaches a method wherein the calling profile cube is a multi-dimensional and multi-level cube and wherein the volume-based calling pattern cubes are multi-dimensional and multi-level cubes (See Han page 3, section 2.3).

As to claim 24, Tuzhilin as modified teaches a method wherein the calling profile cube (i.e. data cube) includes a probability distribution value based on one of the probability distribution on calls to each callee and the probability distribution (i.e. probability distribution) on all calls (See Han page 5, 2<sup>nd</sup> column, 2<sup>nd</sup> paragraph).



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As to claim 25, Tuzhilin as modified teaches a method wherein the dimension include a

day-of-week hierarchy, a time hierarchy, and duration hierarchy (i.e. day\_of\_week) (See Tuzhilin Col. 6, lines 13-15); profile data cube represents a plurality of customers (i.e. customer-dimensional space, See Tuzhilin Col. 7, lines 60-62), and the pattern cube represents an individual customer (See Tuzhilin Fig. 3, item 60).

Allowable subject Matter

4. Claims 2-3, 6-13, 15 and 29-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record (Tuzhilin (U.S. Patent No. 6,236,978 B1) and Jiawei Han, ("Towards On-Line Analytical Mining in Large Databases," ACM SIGMOD Record, 27:1, pp. 97-107, 1998) does not disclose, teach or suggest the claimed limitations of (in combination with all other features in the claims):

retrieving records from the call table and based thereon generating a snapshot cube representing the records from the call table, the snapshot cube having predetermined dimensions; retrieving records from the profile table and based thereon generating a profile cube representing the records from the profile table, the profile cube having predetermined dimensions that are the same as the dimensions of the snapshot cube;

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merging the snapshot cube and the profile cube to generate an updated profile cube and deriving a volume-based calling pattern based on the updated profile cube, as claimed in claim 2.

The prior art of record (Tuzhilin (U.S. Patent No. 6,236,978 B1) and Jiawei Han, ("Towards On-Line Analytical Mining in Large Databases," ACM SIGMOD Record, 27:1, pp. 97-107, 1998) does not disclose, teach or suggest the claimed limitations of (in combination with all other features in the claims):

flagging a particular caller with the probability based calling pattern being analyzed as suspicious;

automatically generating an alert that specifies callers with suspicious probability-based calling pattern;

performing further investigation on callers with suspicious probability-based calling pattern;

cancellation of telephone services for callers with suspicious probability-based calling pattern; and

performing other appropriate remedial actions, as claimed in claims 3 and 29.

The prior art of record (Tuzhilin (U.S. Patent No. 6,236,978 B1) and Jiawei Han, ("Towards On-Line Analytical

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Mining in Large Databases," ACM SIGMOD Record, 27:1, pp. 97-107, 1998) does not disclose, teach or suggest the claimed limitations of (in combination with all other features in the claims):

detecting telecommunication fraud by comparing known fraudulent profiles to caller pattern cubes; the profile engine further generating a profile cube from information selected from the profile table, generating a snapshot cube, updating the profile cube by merging the profile cube and the snapshot cube to generate art updated profile cube, and deriving a calling pattern cube based on the updated profile cube; wherein the profile engine is a scalable computation engine that is implemented by OLAP programming supported by the OLAP server, as claimed in claim 15.

Claims 6-13 are objected to as being dependent from the objected to dependent claim 2.

Claims 30 are objected to as being dependent from the objected to dependent claim 29.

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Points of contact

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yicun Wu whose telephone number is 703-305-4889. The examiner can normally be reached on 8:00 am to 4:30 pm, Monday -Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 703-305-3830. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Yicun Wu  
Patent Examiner  
Technology Center 2100

November 13, 2003



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